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## THE TOPEKA COAL HOLE.

By B. B. SMYTH.

I am indebted to Col. Wm. Tweeddale for the use of the blue print from which the following measurements and section were taken, also for much of the data connected with the digging of the well.

In 1886 a contract was made between the city of Topeka and the American Diamond Rock-Boring Company of New York, for the digging of a well 2,000 feet deep, the company to receive, when the well should be completed, a stipulated sum therefor. Payments as the work progressed were agreed upon, and some payments were made by the city, which were withheld from the company by its bondsmen, who were not assured that the well would ever be completed, and who were liable to the city for the amount paid in case the well should not be completed.

The work was done mostly during the summer of 1886, though owing to inadequate machinery, the work progressed under many difficulties, and various accidents interfered with its progress.

The apparatus used was a diamond drill. The first casing,  $4\frac{1}{2}$  inches in diameter, was put down through surface soil, sand and gravel to clay, a depth of  $82\frac{1}{2}$  feet. Boring was then done with the drill through the strata indicated below. After passing the surface soil, the diameter of the well was  $3\frac{1}{2}$  inches to a depth of 260 feet; 3 inches to a depth of 500 feet, and  $2\frac{1}{2}$  inches the remainder of the distance.

On one or two occasions the point, with considerable of the coupling rods, was lost in the well, could not be pulled out, and the boring resumed from a point near the top of the broken rods, necessitating a redigging of portions of the well. This was probably owing to deflection, in both instances, placing the lower portions of the two borings at some distance apart, as they undoubtedly deflected in different directions.

On one occasion when the steam was discovered to be too high, the engineer passed from the drill to the engine house to open the door of the furnace; but, before reaching it, steam from the boiler passing through a small aperture into the fire-box, blew open the door and blew into his face, injuring him so that he died in two days, and blew down two apple-trees, eight inches in diameter, at distances of 30 and 45 feet. The force of the escaping steam against the ground was so great as to move the boiler endwise toward the north. On reaching a distance of 150 feet from the engine house, the forward end of the boiler became elevated, and the force of the escaping steam raised it past the front gable of a house that stood near the street and carried it over the tops of some young trees about 30 feet high and 300 feet to the north. Here the force of the steam became spent and the boiler fell down on the ground, after breaking some of the branches at the tops of the trees, showing its course through the grove. The steam had all escaped through a four-inch aperture into the fire-box, and the force of the escaping steam suddenly let loose against the ground raised the boiler from its foundations and sent it up like a rocket to a height of fully 30 feet above the ground.

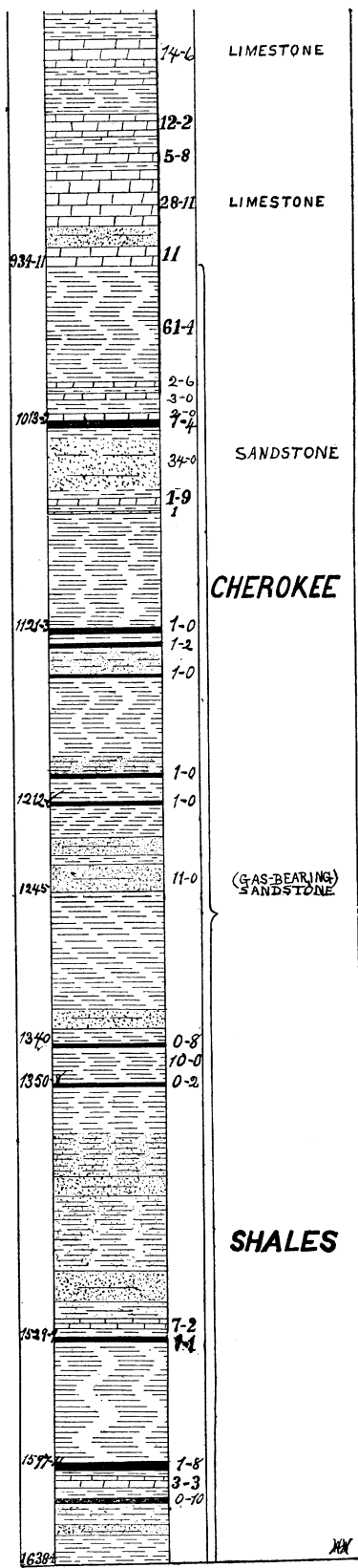
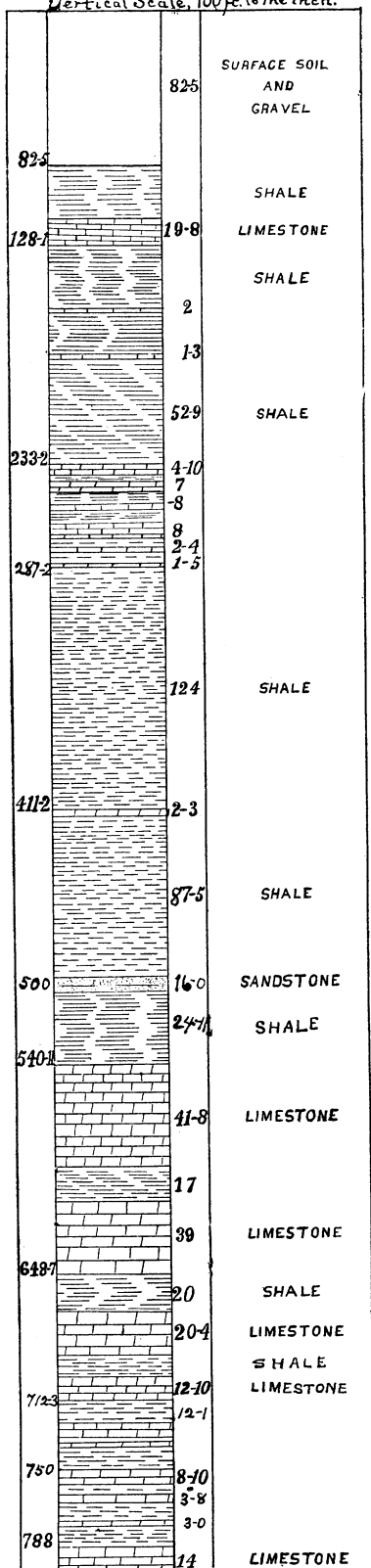
On another occasion, the tower took fire, impeding the progress of the work for some time.

After two or three years, efforts were renewed to sink the well still lower;

# TOPEKA WELL.

## Diamond Drill Core.

Vertical Scale, 100 ft. to the inch.



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but after much difficulty and fruitless labor, the work was finally abandoned, forfeiting the amount the company was to have received from the city, something like \$12,000.

The well was located on Lawrence street, near the Shunganunga creek, between Third and Second streets. The eighty-two and a half feet of surface soil and gravel indicates the depth to which the creek was excavated during the ice period, as the earth to that depth is entirely composed of drift and surface soil.

The zero of depth, or top of the casing, was 974 feet above sea level.

Col. W. Tweeddale was superintendent for the city and M. E. Harrington was superintendent for the contractors.

The following table shows the total depth, the number of strata, the thickness of each stratum, the color of the strata and the character and composition of each stratum as shown by the cores brought up. The cores are deposited with the Kansas Academy of Science.

Total depth. ft.	No. of stra- tum.	ft.	in.	Color.	Kind of stratum.
27—6	1	27—6		Dark .....	Soil, clayey loam.
30—0	2	2—6		Lighter .....	Soil, clayey loam.
42—0	3	12—0		Still lighter ...	Soil, clayey loam.
58—0	4	16—0		Gray .....	Fine sand.
80—6	5	22—6		Gray .....	Coarse sand.
82—6	6	2—0		Red .....	Coarse sand.
101—0	7	18—6		Blue .....	Mud, small p's of core.
108—6	8	7—6		Light blue ....	Laminated fireclay.
111—6	9	2—6		Dark .....	Conglomerate limestone.
123—3	10	11—9		Dark .....	Limestone mixed with clay.
124—3	11	1—0		Blue .....	Fire clay.
128—1	12	3—10		Dark .....	Limestone.
137—8	13	9—7		Blue .....	Clay and mud.
142—6	14	4—10		Blue .....	Laminated fireclay.
150—0	15	7—6		Dark .....	Laminated fireclay.
152—4	16	2—4		.....	Gain in measuring rods.
154—10	17	2—6		Blue .....	Clay.
156—10	18	2—0		Gray .....	Hard limestone.
161—10	19	5—0		Blue .....	Clay or shale.
174—1	20	12—3		Blue .....	Mud.
179—0	21	4—11		Blue .....	Soft clay.
180—3	22	1—3		Gray .....	Fossil shell limestone.
185—3	23	5—0		Blue .....	Laminated fireclay.
189—9	24	4—6		Blue .....	Mud.
193—9	25	4—0		Blue .....	Clay.
194—2	...	0—5		Dark .....	Clay.
198—2	26	4—0		Light .....	Clay.
201—8	27	3—6		Light .....	Mud.
202—2	28	0—6		Dark .....	Clay.
211—6	29	9—4		Light .....	Laminated fireclay.
211—9	30	0—3		Dark .....	Laminated fireclay.
219—2	31	7—5		Light .....	Laminated clay.
233—2	32	14—0		Blue .....	Mud (struck water).
238—0	33	4—10		Gray .....	Hard limestone.

243—7	34	5—7	Light .....	Hard fireclay.
249—11	35	6—4	Gray .....	Hard limestone.
254—7	36	4—8	.....	Gain in measure of rods.
255—3	37	0—8	Light .....	Limestone.
262—4	38	7—1	Black .....	Hard slate or fireclay.
270—4	39	8—0	Light .....	Limestone.
270—11	40	0—7	Light .....	Fire clay.
276—11	41	6—0	Black .....	Hard fireclay.
279—3	42	2—4	Gray .....	Limestone.
285—7	43	6—4	Black .....	Hard fireclay.
287—2	44	1—7	Gray .....	Limestone.
292—2	45	5—0	Light .....	Fire clay.
297—0	46	4—10	Light .....	Fireclay conglomerate, mixed with sand.
	47			
318—8	48	21—2	Light .....	Hard stratified fireclay.
322—8	49	4—0	Light .....	Stratified fireclay, disintegrated.
325—8	50	3—0	Light .....	Hard laminated fireclay.
337—6	51	11—10	Light .....	Very hard laminated fireclay, mixed with sand.
342—0	52	4—6	Light .....	Hard laminated fireclay.
346—8	53	4—8	Light .....	Hard laminated fireclay, mixed with sand.
351—8	54	5—0	Dark .....	Hard laminated fireclay, with black streaks.
357—8	55	6—0	Dark .....	Mud.
365—0	56	7—4	Black .....	Soft laminated fireclay.
372—6	57	7—6	Black .....	Hard laminated fireclay.
377—6	58	5—0	Black .....	Soft fireclay.
387—6	59	10—0	Dark .....	Mud.
396—8	60	9—2	Black .....	Hard laminated fireclay.
411—2	61	14—6	Dark .....	Soft fireclay.
	62			
413—5	63	2—3	Gray .....	Crystalline limestone.
425—5	64	12—0	Dark .....	Hard fireclay.
433—3	65	7—10	Dark .....	Hard laminated fireclay.
443—11	66	10—8	Dark .....	Hard fireclay.
448—11	67	5—0	Dark .....	Hard laminated fireclay.
454—7	68	5—8	.....	Gain in measurement of rod.
469—4	69	14—9	Black .....	Compact fireclay, mixed with sand and grit.
484—0	70	14—8	Dark .....	Hard laminated fireclay.
500—0	71	16—0	Dark .....	Hard laminated clay, mixed with lime.
515—5	72	15—5	Dark .....	Hard laminated fireclay, mixed with lime.
538—5	73	23—0	Dark .....	Compact laminated fireclay.
540—11	74	2—6	Dark .....	Hard fireclay.
546—7	75	5—8	Light .....	Conglomerate limestone, containing shells.
553—9	76	7—2	Gray .....	Hard limestone.
578—0	77	24—3	Light .....	Hard limestone, streaked with clay.

581—6	78	3—6	Black	.....	Hard limestone, fossils.
585—1	79	3—7	Gray	.....	Hard limestone, shell fossils.
592—7	80	7—6	Dark	.....	Limestone, clay streaks.
599—7	81	7—0	Dark	.....	Hard laminated fireclay.
609—7	82	10—0	Blue	.....	Hard laminated fireclay.
612—7	83	3—0	Light gray	....	Limestone.
617—7	84	5—0	Dark gray	....	Limestone.
627—3	85	9—8	Gray	.....	Limestone.
630—3	86	3—0	Black	.....	Clay, mixed with lime.
636—3	87	6—0	Gray	.....	Limestone.
639—5	88	3—2	Blue	.....	Clay, mixed with lime.
640—2	89	0—9	Gray	.....	Limestone.
641—0	90	0—10	Blue	.....	Clay.
642—4	91	1—4	Gray	.....	Limestone.
643—2	92	0—10	Blue	.....	Clay.
645—2	93	2—0	Gray	.....	Limestone.
648—7	94	3—5	Blue	.....	Clay, mixed with limestone.
653—9	95	5—2	Blue	.....	Mud.
663—7	96	9—10	Blue	.....	Clay.
668—7	97	5—0	Blue	.....	Clay.
672—11	98	4—4	Gray	.....	Limestone.
688—11	99	16—0	White	.....	Limestone.
699—5	100	10—6	Dark	.....	Soft clay and mud.
706—3	101	6—10	Gray	.....	Limestone, streaks of clay.
712—3	102	6—0	Gray	.....	Limestone, small pieces.
715—3	103	3—0	Blue	.....	Mud.
718—3	104	3—0	Dark	.....	Hard laminated fireclay.
724—4	105	6—1	Dark	.....	Mud.
731—4	106	7—0	Gray	.....	Hard limestone.
733—9	107	2—5	Black	.....	Hard fireclay.
735—6	108	1—9	Gray	.....	Hard limestone.
740—0	109	4—6	Black	.....	Hard laminated fireclay.
747—8	110	7—8	Dark	.....	Hard laminated fireclay.
750—0	111	2—4	Gray	.....	Hard limestone.
755—0	112	5—0	Gray	.....	Hard limestone.
756—6	113	1—6	Gray	.....	Hard limestone.
761—3	114	4—9	Dark	.....	Hard fireclay.
762—8	115	1—5	Light	.....	Limestone.
763—8	116	1—0	Dark	.....	Limestone.
764—11	117	1—3	Light	.....	Limestone.
770—2	118	5—3	Blue	.....	Soft clay.
774—5	119	4—3	Dark	.....	Fire clay.
777—6	120	3—1	Light	.....	Limestone.
788—0	121	10—6	Dark	.....	Slate, mixed with limestone.
789—3	122	1—3	Dark gray	....	Limestone.
793—3	123	4—0	Dark gray	....	Limestone containing fossil shells.
802—0	124	8—9	Light	.....	Hard limestone.
811—0	125	9—0	.....	.....	Gain in measuring rods.
815—3	126	4—3	Dark	.....	Clay, mixed with limestone.
826—3	127	11—0	Light	.....	Limestone.
829—9	128	3—6	Dark	.....	Conglomerate limestone.
835—3	129	5—6	Very dark	....	Laminated clay or slate.

838—6	130	3—3	Mottled ..... Hard conglomerate fossil limestone.
840—8	131	2—2	Very dark .... Laminated clay.
841—6	132	0—10	Very dark .... Conglomerate fossil limestone.
854—2	133	12—8	Dark ..... Laminated clay, mixed with limestone.
864—10	134	10—8	Gray ..... Hard conglomerate fossil limestone.
866—4	135	1—6	Dark gray .... Hard conglomerate fossil limestone.
871—2	136	4—10	Dark ..... Clay, mixed with limestone.
878—3	137	7—1	Light gray .... Hard limestone.
880—7	138	2—4	Black ..... Hard slate.
882—7	139	2—0	..... Mud.
883—11	140	1—4	Black ..... Hard clay.
890—5	141	6—6	Gray ..... Hard limestone.
895—7	142	5—2	Light gray .... Hard limestone.
899—1	143	3—6	White ..... Hard limestone.
900—3	144	1—2	Black ..... Hard limestone.
901—3	145	1—0	Gray ..... Limestone.
908—6	146	7—3	Gray ..... Hard limestone.
912—10	147	4—4	Gray, ch'g bl'k, Hard limestone.
915—10	148	3—0	Gray ..... Sandstone.
917—7	149	1—9	Blue ..... Laminated clay.
919—1	150	1—6	Blue ..... Laminated clay, small pieces.
920—11	151	1—10	Blue ..... Mud.
923—11	152	3—0	Blue ..... Slate.
934—11	153	11—0	Light gray .... Hard limestone.
938—11	154	4—0	Dark ..... Fire clay.
940—9	155	1—10	..... Increase of measurement.
953—1	156	12—4	Blue ..... Hard fireclay.
954—9	157	1—8	..... Increase.
968—7	158	13—10	Dark ..... Medium hard laminated clay.
981—7	159	13—0	Dark ..... Laminated fireclay or shale.
982—9	160	1—2	..... Mud.
986—5	161	3—8	Dark ..... Laminated fireclay.
994—9	162	8—4	
996—3	163	1—6	Dark ..... Bituminous shale.
998—9	164	2—6	Dark ..... Conglomerate limestone, mixed with clay.
1000—0	165	1—3	Dark ..... Laminated clay or shale.
1003—0	166	3—0	..... Limestone.
1011—2	167	8—2	Light ..... Laminated shale.
1013—2	168	2—0	..... Limestone.
1014—6	169	1—4	..... COAL.
1018—2	170	3—8	..... Laminated shale.
1053—0	171	34—10	Light ..... Laminated sandstone.
1056—4	172	3—4	Light ..... Laminated shale.
1058—1	173	1—9	..... Limestone.
1063—1	174	5—0	Light ..... Laminated shale.
1064—1	175	1—0	..... Limestone.
1072—10	176	8—9	Light ..... Laminated shale.
1080—10	177	8—0	Dark ..... Shale.
	178		
1084—6	179	3—8	Light ..... Laminated shale.
1092—1	180	7—7	Dark ..... Laminated shale.

1102—1	182	10—0	Light .....	Laminated shale.
1103—11	183	1—10	Light .....	Sandstone.
1105—11	184	2—0	Light .....	Shale.
1111—3	185	5—4	Dark .....	Shale.
1121—3	186	10—0	Light .....	Laminated shale.
1122—3	187	1—0	.....	COAL.
1122—6	188	0—3	Black .....	Shale.
1129—4	189	6—10	Light .....	Laminated shale.
1130—6	190	1—2	.....	COAL.
1132—2	191	1—8	Dark .....	Shale.
1140—6	192	8—4	Light .....	Shale.
1144—2	193	3—8	.....	Sandstone and shale.
1146—2	194	2—0	Black .....	Shale.
1147—2	195	1—0	.....	COAL.
1154—2	196	7—0	Light .....	Shale.
1170—2	197	16—0	.....	Laminated shale, with flint.
1173—2	198	3—0	Black .....	Shale.
1183—1	199	9—11	.....	Laminated shale, with flint.
1185—1	200	2—0	Blue .....	Hard blue clay, small pieces.
1189—2	201	4—1	Blue .....	Hard blue clay shale.
	202			
1197—0	203	7—10	.....	Laminated shale, with sand.
1198—0	204	1—0	.....	COAL.
1212—8	205	14—8	.....	Laminated shale, with sand.
1213—8	206	1—0	.....	COAL.
1217—8	207	4—0	.....	Fire clay.
1219—1	208	1—5	.....	Shale.
1220—2	209	1—1	.....	Lost.
1223—2	210	3—0	.....	Soft shale.
1226—9	211	3—7	Light .....	Shale.
1227—9	212	1—0	Very dark ...	Shale slate.
1228—0	213	0—3	Light .....	Slate.
1228—4	...	0—4		
1231—4	214	3—0	Light .....	Shale.
1236—4	215	5—0	.....	Mica sandstone.
1242—4	216	6—0	Blue .....	Sandstone, running into hard blue clay.
1245—0	217	2—8	Blue .....	Hard blue clay.
1248—7	218	3—7	.....	Porous limestone, clay washed out. (GAS found in this formation.)
1249—5	219	0—10	.....	Clay.
1258—5	220	9—0	Variegated ...	Variegated sandstone.
1258—8	221	0—3	Dark .....	Shale.
1259—0	222	0—4	.....	Sandstone.
1261—8	223	2—8	Dark .....	Shale.
1262—11	224	1—3	Black .....	Shale.
1263—2	225	0—3	.....	COAL.
1270—9	226	7—7	Light gray ...	Shale.
1271—9	227	1—0	Black .....	
1272—1	228	0—4	Dark .....	Limestone.
1272—9	229	0—8	.....	
1274—2	230	1—5	.....	Lost.
1276—6	231	2—4	Dark .....	Shale.



1277—0	232	0—6	Gray . . . . .	Limestone.
1278—9	233	1—9	Black . . . . .	Shale.
1279—3	234	0—6	. . . . .	Limestone.
1284—6	235	5—3	Dark . . . . .	Shale.
1287—2	236	2—8	. . . . .	Lost.
1299—7	237	12—5	Blue . . . . .	Hard fire clay, in pieces.
1304—3	238	4—8	. . . . .	Shale, mixed with limestone and sulphur.
1305—0	239	.....	. . . . .	Good clay.
1308—3	240	3—3	. . . . .	Fireclay.
1312—11	241	4—8	. . . . .	Shale.
1317—11	242	5—0	. . . . .	Fireclay in pieces.
1318—10	243	1—0	Dark . . . . .	Shale, small pieces.
1322—7	244	3—8	. . . . .	Lost.
1325—7	245	3—0	. . . . .	Shale, mixed with oxide of iron.
1334—6	246	8—11	. . . . .	Sandstone.
1339—7	247	5—11	Black . . . . .	Shale (rotten).
1340—0	248	0—5	Dark . . . . .	Shale.
1340—8	249	0—8	. . . . .	COAL.
1350—8	250	10—0	Black . . . . .	Shale.
1350—10	251	0—2	. . . . .	COAL.
1351—7	252	0—9	. . . . .	Sandstone.
1351—10	253	0—3	. . . . .	Lost.
1352—9	254	0—11	. . . . .	Hard sandstone, irregular pieces.
1360—6	255	7—9	. . . . .	Fireclay, mixed with limestone.
1369—6	256	9—0	. . . . .	Clay shale and dark clay, running into shale.
1370—6	257	1—0	Dark . . . . .	Fireclay and sandstone mixed.
1372—0	258	1—6	Gray . . . . .	Sandstone.
1380—6	259	8—6	Dark . . . . .	Shale, some limestone.
1382—6	260	2—0	. . . . .	Fireclay, small pieces.
1390—6	261	8—0	Dark . . . . .	Clayey shale, mixed with mica sandstone.
1393—7	262	3—1	. . . . .	No core.
1394—5	263	0—10	. . . . .	Sandstone.
1406—5	264	12—0	Dark . . . . .	Shale, mixed with sandstone.
1418—5	265	12—0	Dark . . . . .	Clay, mixed with sandstone.
1427—4	266	8—11	Gray . . . . .	Sandstone.
1427—8	267	0—4	Light . . . . .	Limestone.
1434—3	268	6—7	. . . . .	Sandstone shale.
1435—5	269	1—2	Gray . . . . .	Sandstone, variegated.
1443—1	270	7—8	Gray . . . . .	Sandstone.
1449—7	271	6—6	Gray . . . . .	Sandstone.
1450—1	272	0—6	Dark . . . . .	Shale.
1453—10	273	3—9	Gray . . . . .	Variegated sandstone.
1454—10	274	1—0	. . . . .	Shale.
1466—10	275	12—0	. . . . .	Sandstone, with shale bands.
1500—0	276	33—2	Dark . . . . .	Laminated shale.
1504—7	277	4—7	Light . . . . .	Sandstone and shale.
1513—7	278	7—9	Light . . . . .	Broken shale with sand.
1520—9	279	7—2	Light . . . . .	Limestone.
1521—9	280	1—0	Dark . . . . .	Shale.
1523—9	281	2—0	Light . . . . .	Shale.

1529—9	282	6—0	Dark . . . . .	Shale.
1530—10	283	1—1	. . . . .	COAL.
1596—10	284	66—0	Light . . . . .	Shale.
1597—4	285	0—6	Dark . . . . .	Shale.
1599—0	286	1—8	. . . . .	COAL.
1599—6	287	0—6	Dark . . . . .	Shale.
1602—9	288	3—3	Light . . . . .	Crystalline limestone.
1606—9	289	4—0	Dark . . . . .	Shale.
1607—7	290	0—10	. . . . .	Coal sediment.
1610—7	291	3—0	Light . . . . .	Variegated sandstone and shale.
1611—1	292	0—6	Light . . . . .	Shale.
1621—1	293	10—0	Dark . . . . .	Shale.
1625—7	294	4—6	White . . . . .	Sandstone.
1638—1	295	12—6	Dark . . . . .	Shale.
1638—4	296	0—3	Light . . . . .	Soft shale.

The accompanying section, drawn to a scale of 100 feet to the inch, was prepared by Miss Hattie Huntsman, under the direction of Prof. E. Haworth, of the State University, Lawrence.